Distributed Network Performance Measurement and Troubleshooting Platform built on PlanetLab

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Outline

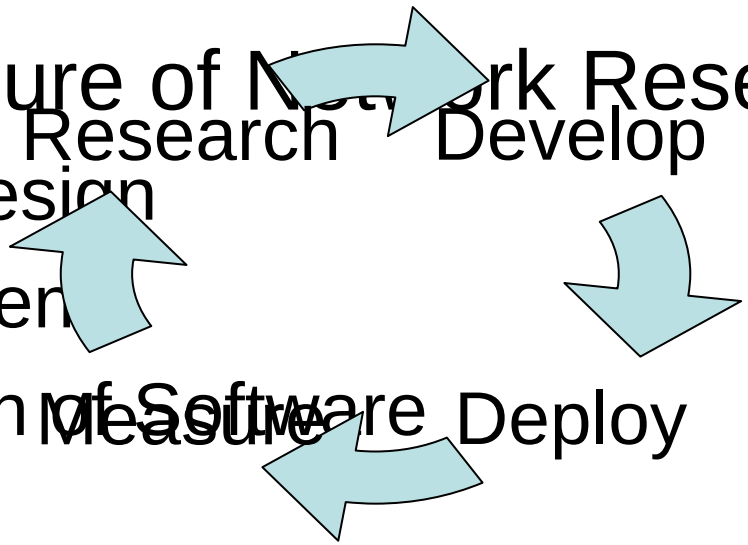
- PlanetLab Overview
- Distributed Network Measurement and Troubleshooting
- Experimental Results
- Conclusions

What is PlanetLab

- **Planet Lab**oratory for global network experiment
- Organization/Culture/Technology
- Pervasive/Robust/Adaptive/Scalable
- Planetary-scale distributed network applications and services

Why PlanetLab

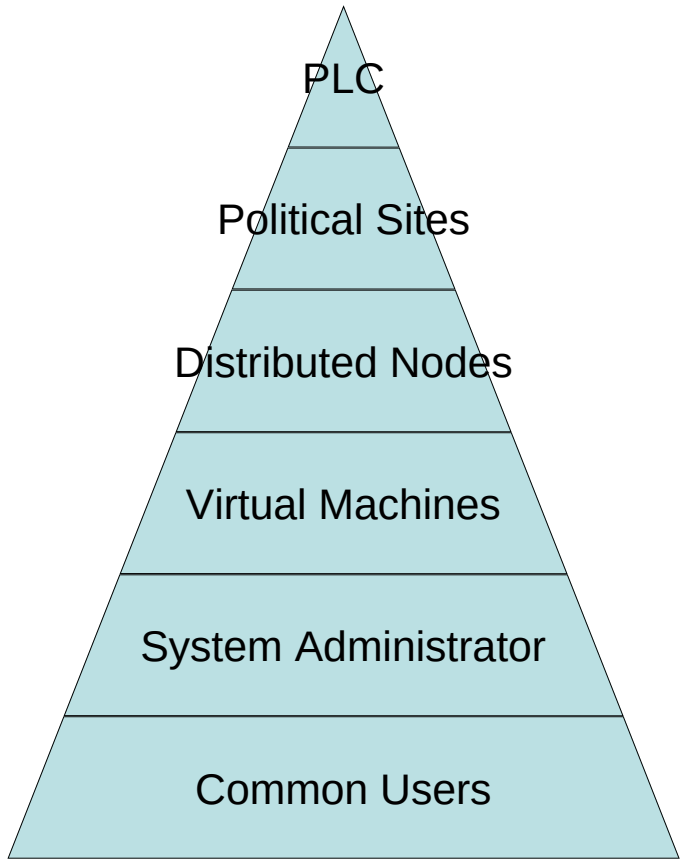
- The procedure of Network Research
  - System Design
  - Development
  - Distribution of Software



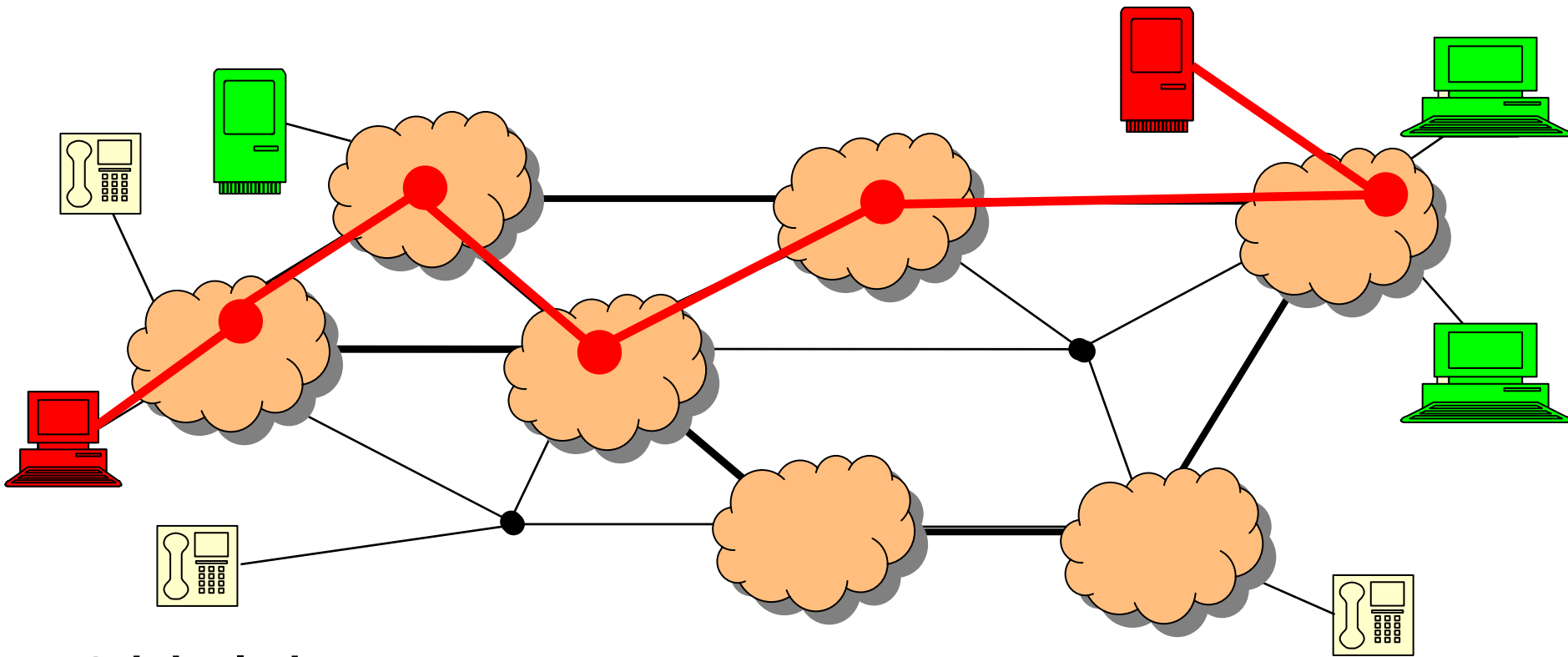
- Three kinds of Activities
  - Development of PlanetLab-like System
  - Development of Services running on it
  - Experimental Results Performed on it

Architecture of PlanetLab

- PlanetLab Center (root)
- Political Sites (Deputy PI)
- Distributed Nodes
  (Computer Resources)
- Virtual Machines
  (Isolated Users)
- Reserved Port
  (System Usage)



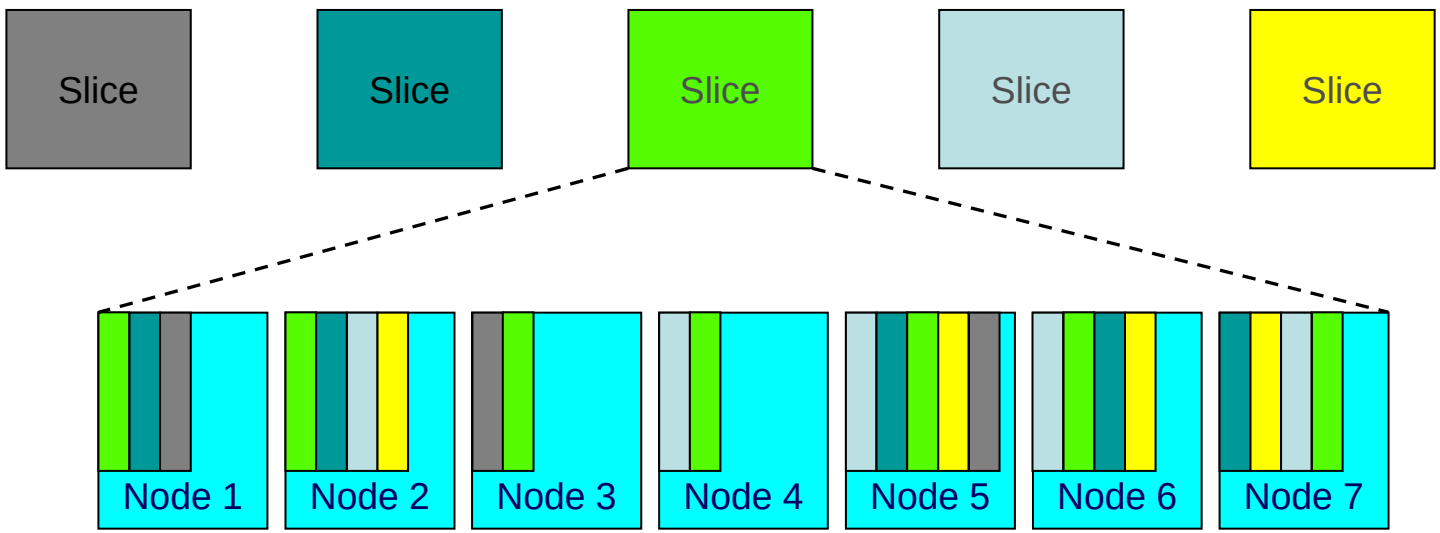
Overlay Networks



Original Phone Network → **Internet Overlay Over Phone Network** → **PlanetLab Overlay Over the Internet**

PlanetLab OS

- Vserver ➔ Virtual Machine
- Vnet ➔ Isolated Network
- Slice ➔ A Set of Sliver
- PlanetLab Account ➔ PlanetLab Community
  PlanetLab Account ➔➔ Slice
  Slice ➔ PlanetLab Nodes

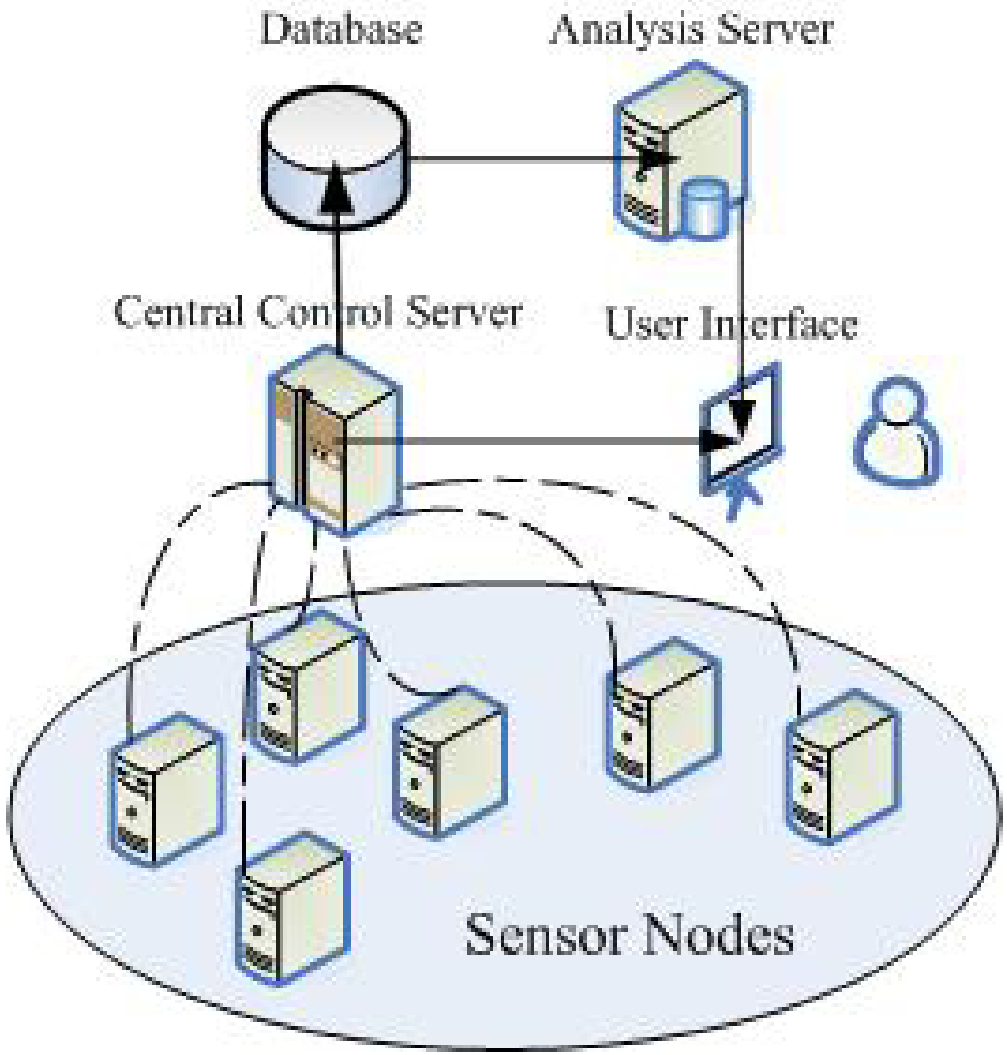


Sample Research Project

- Research about Distributed System
  - PlanetLab OS
  - Emulab etc.
- Research about Distributed Network Application and Service
  - Distributed Media Streaming: Gridmedia …
  - Content Distributed Network: CoDeen …
  - Active Network Measurement: lots of …

CERNET/CERNET2 PlanetLab

Architecture of DNMS



Metrics of Measurement

- Latency
- Packet Loss
- Bandwidth
- Availability
- …

Benefit from PlanetLab

- Distributed Machines
  - Throughout the World
- Network Link Diversity
  - Backbone Link, DSL Link, etc.
- Soul of Internet
  - Contribute a piece, own the whole
- Human Network
  - Almost involve All Top Universities/Institutions

Observation of Experiments

- Computer Failure
  - Floppy/CDROM media dusk; Disk error; Hardware Compatibility
- Link Failure
  - Route Change; Router Down
- Network
  - Firewall; Filters

Future Direction

- Federation Network
  - Different OSs
  - Different Protocols
- Privacy Network
  - Community-owned Network
- Overlay over Overlay
  - Applications ? BT community
  - Services ? Routers

Conclusions

- Good Network Test-bed
- Three Kinds of Research could be followed up
- Dynamic Nature of Network is always underestimated
- Join PlanetLab now
  - http://www.planet-lab.org/
  - http://www.6planetlab.edu.cn/

Questions and Comments ?

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